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CHILTON'S

AUTOMOTIVE INDUSTRIES

JUNE 1988

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JUNE 1988 VOLUME 168, No.6

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Gerry Giovinco of ECW, Audubon, PA penned the cover. Heads-up readers will recognize the twin-tailed bogey as Mikoyan-Gurevich's MiG-29 Fulcrum.

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OVERSTOCKED AND OUTCLASSED

Despite gains, the Big Three still lag the Japanese in inventory control.

by John McElroy

Though the US automakers have been involved in a concerted effort to cut costs since 1981, they are still high-cost producers compared to their Japanese competitors. And this is especially true in the area of inventory control.

If General Motors were able to control its inventory as efficiently as Toyota does, for example, it could free up several billion dollars that it now has tied up in work-in-process, raw materials and supplies. Ford and Chrysler also have billions more tied up in inventory than do their Japanese competitors.

Inventory represents the money that must be invested to buy all the parts and materials that are used to make a car or truck. Companies that can operate with lower levels of inventory thus free up money that can be invested elsewhere.

To their credit, the American automakers have made significant improvements in reducing the inventory at their vehicle assembly plants. In the early part of this decade, for example, a typical US automotive assembly plant could muster only 10 to 20 inventory turns a year.

Today, there are numerous plants that achieve between 80 and 100 turns a year, which is not far off the 125 turns a year that world-class assembly plants achieve. Yet, the five- to 10-fold improvement that the Big Three have achieved in their assembly plants has not been matched elsewhere in their manufacturing operations.

Amongst the Big Three, General Motors now has the lowest inventory investment per car. And considering GM's high level of in-house parts production, its achievement is even more impressive when compared to Ford and Chrysler, which are far less vertically integrated.

INVENTORY INVESTMENT PER CAR

Company	1981	1982	1983	1984	1985	1986	1987
General Motors	$674	$604	$540	$637	$600	$471	$499
Ford	$580	$543	$498	$437	$475	$543	$535
Chrysler	$626	$550	$564	$525	$429	$374	$550
Toyota	$ 54	$ 56	$ 57	$ 62	$ 50	$ 56	$ 77
Mazda	$ 58	$ 77	$ 75	$ 72	$ 87	$ 82	$ 88
Honda	$110	$100	$104	$121	$146	$165	$150
Nissan	$111	$204	$195	$204	$226	$225	$202

Until 1986 Chrysler had achieved the best improvement in inventory reduction. But it seems that the company's acquisition of inefficient American Motors undid much of its previous hard work in this area.

Oddly, the Ford Motor Company, which is often perceived as the most efficient US automaker, has made little headway in improving its inventory management. Apparently, the company still prefers to operate with large production runs, as opposed to the Just-in-time production methods of its Japanese competitors.

> Oddly, Ford—which is often perceived as the most efficient US automaker—has made little headway in improving its inventory management.

Yet even the Japanese cannot be all that sanguine about the trendlines. A glance at the accompanying chart shows that Japanese inventory costs have been rising throughout the decade. Indeed, though Toyota remains the most efficient automaker in inventory control, its inventory costs rose nearly 40% last year.

As the Japanese automakers begin to build larger cars with more content—and higher cost content at that—their inventory costs have gone up. And as the Japanese automakers build more plants overseas, they will be hard pressed to maintain the tightly knit JIT system they have developed in their home market, where their suppliers are clustered around their assembly plants.

But for the time being at least, Japanese automakers still have far less money invested in inventory—money that has been invested elsewhere in far more profitable ventures, such as in new, upscale car programs (Acura, Lexus, Infiniti) or in new areas of technology (four-wheel steering, multivalve engines and four-wheel-drive). Better inventory management could help provide US automakers with capital for its own future product development programs.

For all the improvements the Americans have made, the Japanese remain—for the time being, at least—the industry's best inventory managers. They're still the target at which their American competitors must shoot. AI

CAPITAL PERFORMANCE!

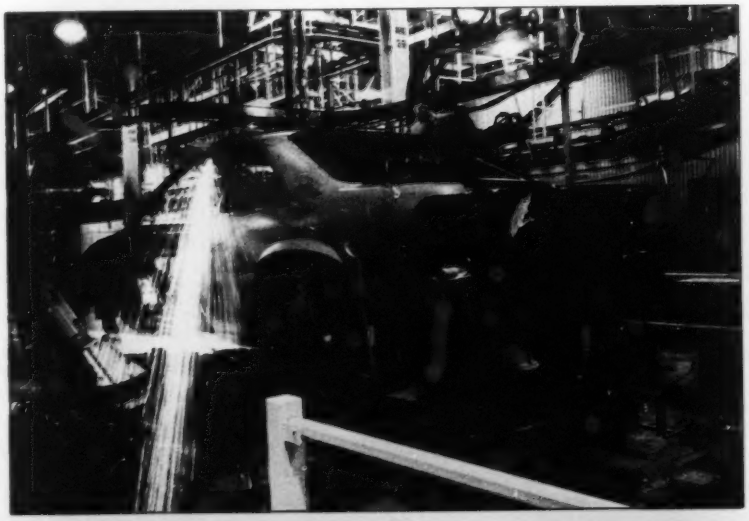
Mazda Flat Rock versus GM Fairfax: Does a billion bucks mean better efficiency?

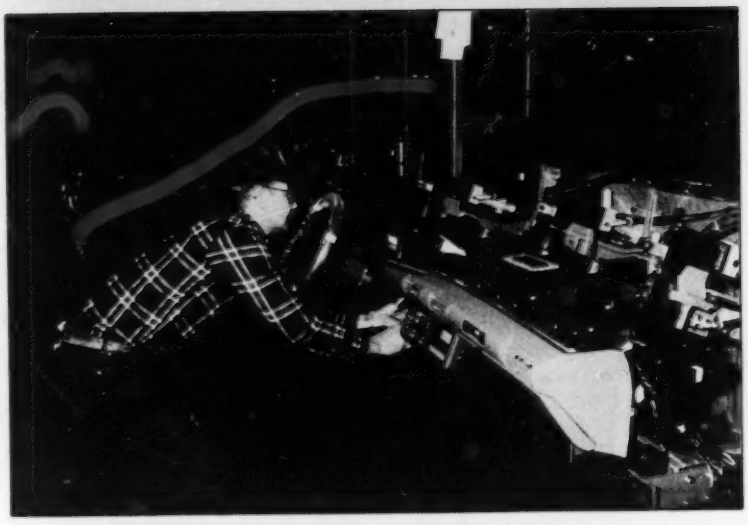
by Gerry Kobe

"World-class efficiency" has become a buzz-phrase among automakers. The critical element, however, to actually earning that title is the ability to withstand the 'trial by fire' of direct comparison. Recently we've had the opportunity to tour the latest manufacturing plants of GM (Fairfax, Kansas) and Mazda (Flat Rock, Michigan). By way of comparison, these are the latest entries in the race for automaking efficiency.

GM's Fairfax plant is a modern, high-tech replacement for the now-idle facility that stands in its shadow. The original plant was constructed to build B-25s during World War II, and during the '50s it simultaneously produced 600 F-84 jet fighters and 70,000 cars a year! But age and an inefficient floorplan mandated that GM start with a clean slate, and the decision was made to build an all-new facility.

To help attain their "world-class" goal, GM sought the input of an often overlooked resource—its workers. It was, in fact, input from the Fairfax rank-and-file that helped determine the layout of the assembly process. Furthering that hands-on approach, the plant also adopted a "team concept," whereby groups of up to ten people are trained to perform each others' jobs. The group then regulates itself as to rotation of duties and even build sequence in order to maintain high worker interest and productivity levels.





C-P-C Fairfax is dedicated to Pontiac Grand Prix (top), claims world's best floor space utilization. Worker ergonomics lag in some areas.

Kaisen In Action

At Mazda, "team concept" takes on a much more comprehensive meaning. This facility exudes the idea of involvement by centrally locating the administrative area. Notice that the word "area" is used instead of offices, for indeed there are no private offices to detract from the feeling of open communications. The plant manager and other top executives are center-stage in a large room that also houses the plant's control room. When high-level meetings take place, they do so in glass-enclosed meeting rooms.

Teamwork at Mazda begins with a six-week training period. During that time, new employees are familiarized with the entire assembly process as well as the Japanese process of *kaisen*, or continuous improvement. Flat Rock workers are also trained to do time-and-motion studies, which document the effectiveness of new ideas that workers (with the help of manufacturing engineers) implement at their station.

Flat Rock builds MX-6 and Probe, employs Japanese kaisen process.

GM may encourage worker involvement, but at Mazda there is *evidence* of it everywhere. In one brilliant example, a wheeled parts tray has been placed on a long inclined table directly beneath the path of the conveyor. As the car enters the work station it catches a spring arm on the top of the parts tray which pushes it at line speed, up the table top where it is most convenient for the workers. When the tray gets to the end of its travel, the spring-arm bends and allows the tray to slide back down the incline and into position for the next vehicle. Many other worker-inspired ideas adorn the plant, but the message is always the same: Teamwork is not a concept at Mazda; it's a way of life.

Dave Campbell, director of manufacturing at C-P-C, is quick to point out that Fairfax has the best-in-class space utilization of any auto plant in the world. At only 2.2 million ft^2 (including on-site stamping), the facility produces the most cars in the smallest floorspace. Contributing to this achievement is the omission of storage areas in favor of receiving docks.

Just-in-time delivery makes good use of these 42 docks by staging incoming parts within 350 ft of their intended use. Part-mix is also held to a minimum by committing only one model, the Pontiac Grand Prix, to the plant.

PLANT PLAYOFF!
The faceoff between Fairfax and Flat Rock

	FAIRFAX	FLAT ROCK
Products	Grand Prix	MX-6, Ford Probe
Investment	$1,050,000,000	$550,000,000
Plant Size	2.2 million ft^2	2.7 million ft^2
Line Speed	66 cars/hour (est)	68 cars/hour
Capacity	232,000 units/year	240,000 units/year
Total Robots	242	350
Employment	3770 hourly	2800 hourly
	430 salary	300 salary
	4100 total	3100 total
Man Hours/Car	30	22

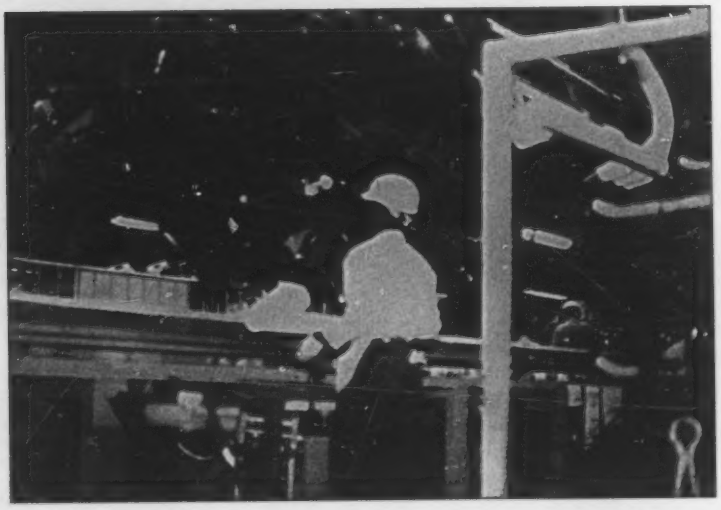
The Bottom Line

At Flat Rock, the 2.7 million ft^2 of building space houses not only an on-site stamping facility, but also a plastics shop which operates six injection molding machines. In addition, the Mazda plant also includes a large material handling center where incoming imported components are removed from their shipping containers, and assembled into modules.

Nonetheless, these extra operations still don't explain why Mazda needs 500,000 more ft^2 of floor space to build roughly the same number of cars that Fairfax does. But maybe this is a hint of things to come. We've heard rumors that Mazda may push production at Flat Rock to 300,000 cars a year.

The use of AGVs is much different

At Flat Rock, evidence of worker involvement is everywhere.



Mazda may up production to 300,000 units/year, eating up extra floor space.

in each of the plants, with Fairfax demonstrating their greatest potential. Mazda uses the vehicles mainly to deliver blanks to the press lines, while GM employs them to move vehicles through the body shop. The extensive use of AGVs at Fairfax allows GM to take advantage of their flexibility to maneuver vehicles into tight spaces that conveyors would not allow.

If efficiency were achieved by robots alone, Mazda would have it in spades, with an unbelievable 276 robots in the body shop alone! Fairfax, in contrast, has a total of 242 for the entire operation, while Mazda boasts a total of 350. Flat Rock also builds the front suspension and drivetrain as a module and then automatically installs it with the help of video cameras and robots. Rear suspension, windshield and backlight are installed in like manner.

Worker ergonomics is one of those areas in which you can only observe and speculate, but the logistics that have been employed at Mazda seem to have escaped the engineers from GM. Watching Fairfax workers hold wrenches over their heads as they try to bolt down suspension parts is enough to evoke compassion in the coldest of hearts.

Their counterparts at Mazda however, work at chest level as the conveyor dips and tilts the car for their comfort. It doesn't seem a lot to ask.

Like all comparisons however, the important thing is the bottom line, and it is here that the two plants seem to go their separate ways. Flat Rock with a capacity of about 240,000 units per year was built at a cost of about $550 million (at 1985 exchange rates).

Even at current exchange rates, the cost of the Flat Rock plant "only" comes to about $820 million, whereas Fairfax, with a capacity of about 232,000 units per year, was built at a cost of over one billion dollars! And yet, as noted above, the Mazda plant is 500,000 ft^2 larger.

The investment in the plant and the payroll are the figures that have the most important impact on the bottom line. They help determine the profit margins for the automaker. Mazda could end up getting a lot more out of its investment: the Flat Rock workforce numbers 3100, while Fairfax employs a total of 4100 workers. (That number may change; at press time, GM announced it would cut Fairfax line speed from 75 cars/hour to 50/hour, resulting in the the possible layoff of 600-900 workers.) We wonder why Mazda needs 1000 fewer employees for roughly the same output.

We can't knock GM for the advancements they've made, because they've come too far for that. Quality is up, productivity is up, the product is very competitive and the prices are right. Proportionately, they have come further, faster than the Japanese.

But the Japanese are moving too, and all GM has done is cut the rate at which their competition is pulling away. If GM wants to *overtake* the Japanese in manufacturing efficiency, its first step should be to admit that the other guys are still ahead. AI

1988 Ignites Ag Demand

by John Stark

Euphoria is rampant throughout the North American farm machinery industry, as sales of farm tractors and self-propelled combines continue to skyrocket. Manufacturers appear readily anxious to put an end to eight unprecedented years of back-to-back falloff of US and Canadian market demand for their machines (see *Snapshot* page for tractor and combine sales charts).

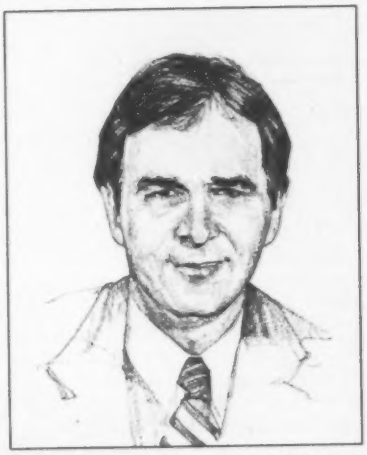
Industry officials are convinced, and rightly so, that turnaround is inevitable. However, some firms could be going overboard on optimistic outlooks. Several farm machinery managers warn that planned production scheduling hikes of 30% or more at local factories, to accommodate similar rises in demand, might unexpectedly backfire.

If the fast pace of tractor sales, as expected, slows down this summer and early fall, inventories of new two-wheel-drive tractors with 100 hp or more could start to bulge on dealer lots once again—prompting a return to major tractor price-cutting programs in late 1988 or early 1989.

Turnaround in demand for new high horsepower tractors ignited in the 1988 first quarter, when Case/IH slashed prices by up to 60% in the 1987 fourth quarter to rid themselves of excessive dealer inventories.

Price discounting has remained low for high-horsepower farm tractors since the start of this year. New vehicle stocks are "extremely tight" at most Deere and Case dealerships.

Inventories of 30-99 hp dairy-type tractors are also low, a result of early



John Stark is editor and publisher of Stark's Off-Highway Ledger.

1987 drawdown on good used tractor stocks and return of buyers to the new vehicle market.

Favorable fundamental market conditions also continue to multiply throughout the business, prompting little risk of inventory buildup.

US buildup and Canadian sales of 2WD tractors with 100 hp or more exploded by 101½% during the first three months of 1988. Prices paid to farmers for soybeans are at their highest level in several years.

Sale of 40-99 hp 2WD farm tractors also soared 32.4% in the same period as cattle prices continue to improve for most farmers.

Poultry prices are also rising dramatically for many farmers in Maryland and the southern and southeastern parts of the US. It's a pleasant relief for farmers hard-pressed after eight straight years of failing business and a surprise for farm machinery OEMs. They fully expected poultry activity to expand at the expense of cattle (red meat) operations.

Dry weather has taken over much of the Plains States and Western Canada. It will undoubtedly delay plantings of corn and wheat. Subsequently, large tractor and combine sales should continue to grow in the coming months as farmers scramble to sow their crops when weather conditions improve.

Four-wheel-drive tractor sales went up 70% in the first quarter of this year and combines leaped ahead by 300%, as farmers attempted to beat the recent increase of interest rates by buying machines earlier than planned.

What's unclear is this: Did rising interest rates actually pull sales of 4WD tractors and combines ahead by three to six months? Or did they pull marginal buyers back into the market?

Nonetheless, interest rate hikes are seen by several farm machinery firms as having a favorable impact on business activity by inflating prices for commodities and improving cash flow.

Farmers, they note, have historically elected to re-enter the farm machinery market to purchase new vehicles when cash flow is at its highest.

Farm machinery manufacturers are currently gearing up for major increases in production of tractors and combines, to fill the market void.

However, the euphoria might be overstated. More substantial growth in cyclical market demand is seen materializing next year.■

AG EQUIPMENT ON THE REBOUND!

TRACTOR AND COMBINE SALES

	1988 1st Qtr.	*% Change Year Ago*	*1987 4th Qtr.*	*% Change Year Ago*	*1987 3rd Qtr.*	*% Change Year Ago*	*1987 2nd Qtr.*	*% Change Year Ago*
0-43hp	11,065	-00.4	12,555	-05.1	15,650	+04.9	25,420	-02.4
40-99hp	9610	+32.4	11,330	+05.1	9105	+00.6	12,060	-04.2
100+hp	4665	+101.5	5420	+21.1	7995	+289	3920	-48.4
All4WDs	935	+70.0	1075	-13.3	455	-27.2	555	-37.3
TtlTrac.	25,275	+23.7	38,330	+02.2	33,205	+25.1	41,325	-09.9
SPComb	1580	+320.0	4020	+19.1	3530	-29.4	760	-21.2
Total	27,855	+28.8	34,400	+03.9	36,735	+16.1	42,085	-10.2

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1989: Greater Than The Sum Of Its Parts (And Components)

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What's new in Parts and Components for '89? Blowers, six-cog trannies and more! Feature begins on page 34.

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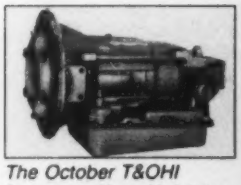

The October T&OHI features New Vehicles, Parts and Components

The Drought And Ag Equipment Sales

by John Stark

Drought in the Northern Plains, the Corn Belt and Delta regions of the US, as well as in western Canada, is starting to worry the North American farm machinery business. Farmers are worried that, if dry weather continues, corn and wheat crops will be destroyed, while soybean yields might plummet too.

Ag equipment makers are worried that, if dry weather persists, sales of highly profitable large two- and four-wheel-drive farm tractors and self-propelled combines might wither in the 1988 second half.

The drought could also further erode feed grain yields. Prices may climb even more, prompting cattle farmers to liquidate their herds as economic operating conditions turn sour. It could gut further turnaround in the smaller 40-99 hp segment of the two-wheel-drive tractor business.

The North American farm machinery business had been staging an impressive comeback during the first half of this year, following eight straight years of disappointing market developments. Overall unit volume is up nearly 14%. Manufacturers had been expecting all along that vehicle sales would be down in the second half, due to strong year-ago turnover fueled by major tractor price cutting at Case/IH and John Deere.

Farm machinery officials believe the economic impact of the drought has been overstated. Corn yields could be

John Stark is editor and publisher of Stark's Off-Highway Ledger.

off 25%; wheat might be down 10% and soybeans could escape. Soaring prices for the salvaged crops, idle acreage now freed for plantings of hardier crops and Federal drought aid will likely offset much of the adverse impact from drops in yields, netting little slowdown in spending by farmers for new machines.

As US agricultural exports advance 20% in 1988, to $33.5 billion – the highest level since 1984 – farm debt falls another 5.5% and debt-to-equity ratios narrow, the value of an average acre of farmland should go up 3.1%, ending a five-year freefall.

It represents a significant development. Real estate assets, seen rising 1% this year, are used by many farmers as collateral for machinery loans.

Even though farm machinery sales during the first half of 1988 jumped 14% ahead of last year, it will no doubt falter in the second half, netting 3% overall gain. This is in line with the 1% gain seen for farm real estate assets and indicates pent-up demand for farm vehicles still abounds.

Consequently, drought may bottle up pent-up demand for the remainder of this year. But the upshot is this: The 1989 and, more likely, 1990 years could explode into periods of fast-paced recovery. Interestingly, some ag machinery industry managers see vehicle demand in 1990 approaching the record levels of 1979!

Deere appears ready to enter the high growth period of the 1990s from a position of superiority, after consolidating its leadership role in 1987. Ford New Holland could offer Deere its most serious threat. Ford overtook Case and Kubota last year, as Kubota's US and Canadian market penetration fell victim to the soaring yen. But that may be remedied next year when Kubota opens an implement manufacturing site in the US.

Weaker competitors tail the Big Four (Deere, Ford, Case and Kubota). They include Massey Ferguson, Deutz Allis, White-New Idea Farm Equipment and the bankrupt Massey Combines. Time will tell where these lower volume sellers will fit into future business activity.■

US FARMLAND VALUES BY REGION, BY ACRE

REGION	*Feb.'88*	*% Change*	*Feb.'87*	*% Change*	*Feb.'86*	*Apr.'84*	*Apr.'82*
Northeast	$1474	+08.7	$1602	+13.5	$1416	$1414	$1364
Lake States	$639	+06.9	$598	-14.8	$702	$1099	$1234
Corn Belt	$888	-09.0	$815	-09.7	$903	$1414	$1642
Northern Plains	$306	+07.0	$286	+11.5	$323	$499	$547
Appalachia	$972	+02.2	$951	-03.3	$983	$1090	$1083
Southeast	$1056	+05.6	$1000	+00.1	$999	$1094	$1095
Delta	$665	-00.2	$666	-16.4	$797	$1040	$1135
Southern Plains	$457	-03.0	$471	-11.0	$529	$614	$576
Mountain	$227	-02.6	$233	-05.7	$247	$319	$325
Pacific	$951	-02.4	$974	-12.0	$1107	$1361	$1346
Total (48 States)	$564	+03.1	$547	-08.1	$595	$782	$823

Note: Data represents average US dollar value/acre of farmland and buildings.

AUTOMAKER QUARTERLY REPORT

Domestics flex their muscles in the second quarter.

by Dr. Thomas O'Grady

After three consecutive years of decline, the domestic share of the US passenger car market may rise for the 1988 calendar year. Second quarter sales results show the strength of the domestics this year: a 64.4% share versus 64.0% during the second quarter of 1987 and 62.5% for *all* of 1987.

The weak dollar and competitive markets restricted sales of some traditional imports. Market share of Japanese-built models during the second quarter was approximately the same as one year ago. Price increases hurt the Europeans, especially in the luxury arena—their share dropped from 6.4% in 1987 to 4.7% this quarter.

GM's total corporate share is down for the quarter, but it can regain some of '87's lost share if it has a good second half this year.

Ford's exciting new products are now paying off in market share. And Chrysler gained nearly one point of share from second quarter '87.

Dr. Thomas O'Grady heads Integrated Automotive Resources, Inc. in Wayne, Pennsylvania.

Honda and Toyota saw profitable second quarters, but Nissan sales were down. Most of the smaller Japanese companies suffered losses as a result of price increases and strong domestic sales. Mazda, however, increased its share from 1.8% in the second quarter of 1987 to 2.3% this period with new introductions. And Korea's Hyundai increased it's share of the market rather modestly.

GM, with its C/K series and Chrysler are likely to be the winners in the light truck market this year. GM's overall share of that market rose from 30.9% in the second quarter of 1987 to 34.1% in 1988. Ford's share dropped from 30.1% to 30.0% during the same period. The Chrysler/Jeep share rose from 20.0% in the second quarter of 1987 to 22.2% for the same period 1988. The Japanese share of light truck markets fell from 18.8% in the second quarter of 1987 to 16.6%. AI

WHAT'S HOT! US Auto Sales (2nd Quarter Results)

Carline	'88	'87	% Change
Corsica/ Beretta	121,394	64,327	88.71%
Taurus	109,072	96,445	13.09%
Escort	100,012	107,031	(6.56%)
Accord*	94,606	76,961	22.93%
Cavalier	85,508	71,655	19.33%
Excel	77,467	70,892	9.27%
Tempo	74,838	65,284	14.63%
Grand Am	67,556	60,970	10.80%
Celebrity	67,216	92,510	(27.34%)
Sentra	66,789	62,274	7.25%

* – Includes imports
( ) – Negative value

US Passenger Car Market Shares 2nd Qtr '88

Manufacturer	Sales	% Total
General Motors	1,061,239	36.94%
Ford	629,373	21.91%
Chrysler	324,600	11.30%
Honda/Acura	192,940	6.72%
Toyota	171,061	5.95%
Nissan	128,610	4.48%
Hyundai	77,467	2.70%
Mazda	65,331	2.27%
VW	48,816	1.70%
Subaru	39,236	1.37%
Total	2,872,825	

(Continued)

Passenger Car Market Share By Geographic Base

Second Quarter 1988

Manufacturers	Total Sales	Total Market Share
American	1,850,372	64.41%
Japanese	530,029	18.45%
European	133,844	4.66%
Transplants (VW, Honda, NUMMI, Nissan, Mazda/Ford)	225,539	7.85%
Other Imports (Excel, Festiva, Fox, LeMans, Precis)	132,978	4.63%
Total	**2,872,825**	**100.00%**

SECOND QUARTER DOMESTIC LIGHT TRUCK PRODUCTION

COMPANY	FULL-SIZE TRUCKS	COMPACT TRUCKS	FULL-SIZE VANS	COMPACT VANS	FULL-SIZE SPORTS UTILITY	COMPACT SPORTS UTILITY	TOTAL 1988	TOTAL 1987
FORD	178,600	95,885	63,419	50,102	16,031	30,328	434,365	401,457
CHEVROLET	133,941	75,132	43,951	43,707	38,103*	47,146	381,980	325,460
GMC	45,251	17,017	16,396	10,923	12,205	12,372	114,164	197,168
CHRYSLER	23,091	28,900	25,727	128,422	6238	—	212,378	197,168
JEEP	—	11,804	—	—	4325	65,167	81,296	62,381
NISSAN	—	20,631	—	—	—	—	20,631	21,887

*Includes Suburban and P-model